<table>
<thead>
<tr>
<th>Sl. No</th>
<th>University Department / Centre</th>
<th>Title of the Supportive Course (MOOCs)</th>
<th>Subject Code</th>
<th>Name of the Mentor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Animal Science</td>
<td>Wildlife Ecology</td>
<td>NZOMSB</td>
<td>Dr. S. Kalidass</td>
</tr>
<tr>
<td>2.</td>
<td>Biotechnology</td>
<td>Genetic Engineering: Theory and Application</td>
<td>NBTMSB</td>
<td>Dr. S. Venkatesh</td>
</tr>
<tr>
<td>3.</td>
<td>Centre for Information Technology &amp; Engineering (CITE)</td>
<td>Social Networks</td>
<td>NITMSB</td>
<td>Mrs. P. Kavitha</td>
</tr>
<tr>
<td>4.</td>
<td>Centre for Marine Science &amp; Technology (CMST)</td>
<td>Dairy and Food Process and Products Technology</td>
<td>NMBMSB</td>
<td>Dr. M. Michael Babu</td>
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<tr>
<td>5.</td>
<td>Chemistry</td>
<td>Analytical Chemistry</td>
<td>NCHMSB</td>
<td>Dr. K. Swarnalatha</td>
</tr>
<tr>
<td>6.</td>
<td>Commerce</td>
<td>Principles of Management</td>
<td>NCOMSB</td>
<td>Dr. K. Rajamannar</td>
</tr>
<tr>
<td>7.</td>
<td>Communication</td>
<td>Text, Textuality and Digital Media</td>
<td>NMCMSB</td>
<td>Mr. Gnana D. Hans</td>
</tr>
<tr>
<td>8.</td>
<td>Computer Science &amp; Engineering</td>
<td>Introduction to Operating Systems</td>
<td>NCSMSB</td>
<td>Mr. K. Aravind Kumar</td>
</tr>
<tr>
<td>9.</td>
<td>Criminology and Criminal Justice</td>
<td>Human Resource Development</td>
<td>NCJMSB</td>
<td>Dr. R. Sivakumar</td>
</tr>
<tr>
<td>10.</td>
<td>Economics</td>
<td>Economics of Health and Health Care</td>
<td>NEOMSB</td>
<td>Dr. G. Monikanda Prasad</td>
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<tr>
<td>11.</td>
<td>Education</td>
<td>Educational leadership</td>
<td>NEDMSB</td>
<td>Dr. S.R. Sundaravalli</td>
</tr>
<tr>
<td>12.</td>
<td>English</td>
<td>Soft Skills</td>
<td>NENMSB</td>
<td>Dr. P. Vedamuthan</td>
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<td>13.</td>
<td>Geotechnology</td>
<td>Remote Sensing and GIS</td>
<td>NGPMSB</td>
<td>Dr. Y. Srinivas</td>
</tr>
<tr>
<td>14.</td>
<td>History</td>
<td>Classical sociological Theory</td>
<td>NHSMSB</td>
<td>Dr. R. Ramasubramanian</td>
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<tr>
<td>15.</td>
<td>Management Studies</td>
<td>Soft Skills For Business Negotiations And Marketing Strategies</td>
<td>NMSMSB</td>
<td>Dr. M. Bhoopal</td>
</tr>
<tr>
<td>16.</td>
<td>Mathematics</td>
<td>Numerical methods</td>
<td>NMAMSB</td>
<td>Dr. V. Sankar Raj</td>
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<tr>
<td>17.</td>
<td>PG - Extension Centre</td>
<td>Soft Skills</td>
<td>NENMSB</td>
<td>Dr. N.T. Muthuraja</td>
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<td>Dr. P. Indu</td>
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<td>Course Title</td>
<td>Subject Title</td>
<td>Department</td>
<td>Instructor</td>
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<td>18.</td>
<td>Pharmaceutical Chemistry</td>
<td>Computer Aided Drug Design</td>
<td>NOCMSB</td>
<td>Dr. K. Dhanalakshmi</td>
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<tr>
<td>20.</td>
<td>Plant Science</td>
<td>Ecology and Environment</td>
<td>MBYMSB</td>
<td>Dr. M. Udayakumar</td>
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<tr>
<td>21.</td>
<td>Psychology</td>
<td>Developing Soft Skills and Personality</td>
<td>NPYMSB</td>
<td>Dr. T. Yuvaraj</td>
</tr>
<tr>
<td>22.</td>
<td>Renewable Energy Science</td>
<td>Energy Economics and Policy</td>
<td>NREMSB</td>
<td>Dr. V. Sabarinathan</td>
</tr>
<tr>
<td>23.</td>
<td>Sri Paramakalyani Centre of Excellence in Environmental Sciences</td>
<td>Integrated Waste Management for a Smart City</td>
<td>NEVMSB</td>
<td>Dr. G. Annadurai</td>
</tr>
<tr>
<td>24.</td>
<td>Sri Paramakalyani Centre of Excellence in Environmental Sciences</td>
<td>Nanotechnology in Agriculture</td>
<td>NNSMSB</td>
<td>Dr. G. Annadurai</td>
</tr>
<tr>
<td>25.</td>
<td>Statistics</td>
<td>Introduction to Biostatistics</td>
<td>NSTMSB</td>
<td>Dr. V. Denesh Kumar</td>
</tr>
<tr>
<td>26.</td>
<td>Sociology</td>
<td>Developing Soft Skills and Personality</td>
<td>NPYMSB</td>
<td>Dr. R. Murugeson</td>
</tr>
</tbody>
</table>
COURSE OUTLINE:
Wildlife is an enamouring field for most of us. In my professional tenure, I’ve observed numerous people flocking to get a glimpse of the tiger, to get an opportunity of diving with the fishes, or to get access to a National Park or a Wildlife Sanctuary. And these experiences gets even more endearing when you get to know how the show is getting managed, how and why we regulate access, and also how we maintain grasslands and water bodies to keep the systems up and running. This course will cover one such aspect of wildlife management by providing an overview of the field of Ecology.

ABOUT INSTRUCTOR:
Dr. Ankur Awadhiya (B. Tech IIT Kanpur 2009, Ph. D IIT Kanpur 2015, AIGNFA IGNFA Dehradun 2016, PGDAWM WII Dehradun 2018) is an IFS officer borne on the Madhya Pradesh cadre. His interests include photography, tourism, research, instrumentation and creative literary pursuits.

Prof. Mainak Das is a Faculty of IIT Kanpur, India in the Department of Biological Science & Bioengineering Science since April 2010. He did his bachelor’s degree in Agriculture from College of Agriculture, Indore. Thereafter he did his PG in Animal Physiology from National Dairy Research Institute, Karnal, India. He did his doctoral studies from College of Medicine of University of Central Florida.

COURSE PLAN:
- Week 01: Introduction
- Week 02: Ecological structure
- Week 03: Ecological interactions
- Week 04: Ecological energetics
- Week 05: Population Ecology
- Week 06: Community Ecology
- Week 07: Distribution & abundance
- Week 08: Management of threatened species
- Week 09: Human Ecology
- Week 10: Ecology of change
- Week 11: Applied Ecology
- Week 12: Revision
GENETIC ENGINEERING: THEORY AND APPLICATION

PROF. VISHAL TRIVEDI
Department of Biotechnology
IIT Guwahati

TYPE OF COURSE : Rerun I Elective I UG/PG
COURSE DURATION : 12 weeks (20 Jul'20 - 09 Oct'20)
EXAM DATE : 17 Oct 2020

PRE-REQUISITES : General Biology 10+2
INTENDED AUDIENCE : UG/PG/PhD/Scientist in industry
INDUSTRIES APPLICABLE TO : Companies related to biotechnology

COURSE OUTLINE :
In this we discuss about biotechnology, its scope and impact on human life with several customized products. The Development of technology and generation of product has multiple steps and understanding these steps are being covered in this course with a discussion of biotechnology application at the end. By the end of this course, student will be able to understand following aspects of biotechnology:
1. Basic metabolic pathways and their regulation.
2. Microbial growth kinetics with an emphasis on fermentation
3. Basic molecular biology tools used in biotechnology.
4. Basic methodology for product recovery and analysis.

ABOUT INSTRUCTOR :
Prof. Trivedi did his Ph.D. from Central Drug Research Institute, Lucknow in the field of Structural Biology. From his postdoctoral research at the Department of Molecular and Cellular Biology, Harvard University and Molecular Oncology Research Institute, Tufts University, Boston, USA, he gained extensive research experience in the field of cell biology, intracellular signal transduction, and immunology. Currently, his laboratory at Department of Biosciences and Bioengineering has an active group working and exploring questions related to malaria parasite biochemistry, the role of novel proteins, development of anti-malarial agents, and lastly understanding factors playing a crucial role in immunomodulation and host pathology in different organs.

COURSE PLAN :
Week 1: Introduction and Basics of Biological System.
Week 2: Basics of Biological System
Week 3: Basics of Cloning (Part I)
Week 4: Basics of Cloning (Part II)
Week 5: Recombinant DNA Technology (Part I)
Week 6: Recombinant DNA Technology (Part II)
Week 7: Product Recovery and Characterization
Week 8: Biotechnology in Social Welfare
Week 9: Lab Demo related to the molecular biology protocols
Week 10: Lectures by industry people- Bio pharma industry, real life experience
Week 11: Latest cutting edge technology for Genome editing.
Week 12: Conclusion
SOCIAL NETWORKS

PROF. SUDARSHAN IYENGAR
Dept. of Computer Science and Engineering
IIT Ropar

COURSE OUTLINE:
The world has become highly interconnected and hence more complex than ever before. We are surrounded by a multitude of networks in our daily life, for example, friendship networks, online social networks, world wide web, road networks etc. All these networks are today available online in the form of graphs which hold a whole lot of hidden information. They encompass surprising secrets which have been time and again revealed with the help of tools like graph theory, sociology, game theory etc. The study of these graphs and revelation of their properties with these tools have been termed as Social Network Analysis.

ABOUT INSTRUCTOR:
Prof. Sudarshan Iyengar has a Ph.D. from the Indian Institute of Science and is currently working as an assistant professor at IIT Ropar and has been teaching this course from the past 5 years. Apart from this course, he has offered several other courses in IIT Ropar like Discrete Mathematics, Theory of Computation, Cryptography, Probability and Computing etc. His research interests include social networks, crowdsourced knowledge building and computational social sciences.

COURSE PLAN:

Week 01 : Introduction
Week 02 : Handling Real-world Network Datasets
Week 03 : Strength of Weak Ties
Week 04 : Strong and Weak Relationships (Continued) & Homophily
Week 05 : Homophily Continued and +Ve / -Ve Relationships
Week 06 : Link Analysis
Week 07 : Cascading Behaviour in Networks
Week 08 : Link Analysis (Continued)
Week 09 : Power Laws and Rich-Get-Richer Phenomena
Week 10 : Power law (contd..) and Epidemics
Week 11 : Small World Phenomenon
Week 12 : Pseudocore (How to go viral on web)

INDUSTRIES APPLICABLE TO: Any Processing Industry such as Britannia, ITC, Hindustan Lever, Mother Dairy, Amul, etc.

COURSE OUTLINE:
This course will cover basics of dairy (liquid food) food processing and preservation technologies required in any dairy and food processing industries. The basic knowledge on dairy food processing is intermingled with most of the unit operations at some or other stage of processing. Since, this basic aspect of food processing and preservation is not taught in most of the Agricultural engineering institutions elaborately, a comprehension of these aspects of processing and preservation will enrich the knowledge base of the students in general.

ABOUT INSTRUCTOR:
Prof. Tridib Kumar Goswami, a NAAS, ISAE, IE, AABS Fellow, did his B.Sc. in Chemistry (Hons) from University of Calcutta, B.Tech. in Food Technology and Biochemical Engineering from Jadavpur University, Ph.D. from IIT Kharagpur. After serving Kwality Ice Cream, Bombay for 1½ years, he joined IIT Kharagpur in 1989 and is still continuing as a Professor. He has earned 5 Indian Patents, published 104 papers in peer reviewed reputed journals, 55 conference proceedings. He has written 4 books and 14 book chapters published by International publishers. He has travelled around the world for presenting papers and was specially invited by Jeonbuk National University, Korea with full sponsorship in 2009. He has guided 14 Ph.D., out of which 3 theses have been awarded the prestigious Jawaharlal Nehru Award offered by ICAR. One of his papers was awarded the prestigious N.N. Mohan Memorial Award for 2009 conferred by AIFPA, New Delhi for Best Paper of the year.

COURSE PLAN:

Week 01: Basic principles and methods of food processing and preservation. Emerging Technologies in food processing. Food additives and preservatives.

Week 02: Food laws and standards. Effect of processing on acceptability and nutritive value of food.

Week 03: Physico-chemical properties and structure of milk and milk constituents.

Week 04: Chemical and microbial spoilage of milk and milk products; Fluid milk processing, packaging and distribution.

Week 05: Common dairy processes – cream separation (standardization), pasteurization, sterilization and Homogenization.

Week 06: Process technology for manufacture of evaporated milk, condensed milk, dried milk, malted milk, infant and baby foods, ice-cream, cheese, butter, fermented milk and indigenous dairy products.

Week 07: Methods and procedures for sampling and testing of milk and milk products. Laws and standards for milk and milk products.

Week 08: Technological processes for industrially manufactured foods of commercial importance, from plant and animal origin.

Week 09: Cereals, vegetables, fruits, meats, poultry and egg products; Bakery, pasta and confectionary products, ready to eat foods, fermented foods, alcoholic and non-alcoholic Beverages, tea, coffee and cocoa, fabricated foods.

Week 10: Packaging materials; Characteristics, properties and their design. Packaging requirement for different processed and unprocessed foods.


Week 12: Gas packaging and modified atmosphere Package design. Shelf life prediction of foods in packages. Quality control in Food packaging. Product safety and packaging regulations.
PROF. DEBASHIS RAY  
Department of Chemistry  
IIT Kharagpur

TYPE OF COURSE : Rerun| Elective| UG  
COURSE DURATION : 12 weeks (20 Jul'20 - 9 Oct'20)  
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : BE/B.Tech, M.Sc  
PRE-REQUISITES : H. S. +2 Level  
INDUSTRIES APPLICABLE TO : Hindustan Lever Ltd, Ranbaxy, Shell, ONGC, NTPC, SAIL, CIL, Waters, PHE Dept.

COURSE OUTLINE :  
It will give the opportunity to study and use specialized instruments and specific methods to separate, identify, and quantify the unknown substance. Spectroscopic technique will consist of applications of atomic absorption spectroscopy, atomic emission spectroscopy, ultraviolet-visible spectroscopy, X-ray fluorescence spectroscopy, infrared spectroscopy, Raman spectroscopy and Mössbauer spectroscopy. In electrochemical methods cyclic voltammetry, coulometry and amperometry will be discussed. The course has applications that include forensic science, analysis of biological samples, clinical analysis, environmental analysis, and materials analysis.

ABOUT INSTRUCTOR :  
Prof. Debashis Ray is an M.Sc. (Gold Medalist) from Burdwan University in 1985 and did his Ph. D. from IACS (degree from Jadavpur University) in 1989 and in faculty roll of IIT Kharagpur from 1990. Specialization: Inorganic Chemistry, Coordination Chemistry, Bioinorganic Chemistry, Analytical Chemistry. Received INSA YS Medal in 1994 and CRSI Bronze Medal in 2007. Visited Indiana University during 1995 availing BOYSCAST fellowship of Govt of India, Oxford University in 2001 using INSA-RSC exchange program and was a Humboldt Fellow during 2002-2003 in MPI, Muelheim, Germany.

COURSE PLAN :  
Week 01 : Chemicals and Materials Analysis Methods  
Week 02 : Role of Analytical Chemistry and Techniques  
Week 03 : Chemical Equilibria and Basis of Chemical Analysis  
Week 04 : Spectrochemical Methods - I  
Week 05 : Spectrochemical Methods - II  
Week 06 : Thermal Methods - I  
Week 07 : Thermal Methods - II  
Week 08 : Electroanalytical Methods - I  
Week 09 : Electroanalytical Methods - II  
Week 10 : Electrochemical Sensors  
Week 11 : Bioanalytical Chemistry  
Week 12 : Applications of Chemical Analysis
Principles of Management

By Prof. Susmita Mukhopadhyay, Prof. S. Srinivasan | IIT Kharagpur

The objective of this course is to acquaint students with the terms, concepts, and points of view used in management and its historical evolution, ethics, social responsibility and environmental issues; provide students with a working knowledge of the skills and functions necessary to be an effective, efficient manager; provide an introduction to the theory and practice of managing organizations; examine the management functions (planning, organizing, leading or influencing, and controlling) and the impact of those functions on the business organization.

INTENDED AUDIENCE: Everyone who is interested to get acquainted with the terms, concepts, and points of view used in management and its historical evolution, ethics, social responsibility and environmental issues.

PREREQUISITES: None

INDUSTRIES SUPPORT: All industry. Knowing the terms, concepts, and points of view used in management and its historical evolution, ethics, social responsibility and environmental issues is essential for smooth running of organization and proper organizational functioning.

COURSE LAYOUT

Week 1: Management: Definition, nature, purpose and scope of management, Skills and roles of a Manager, functions, principles; Evolution of Management Thought, Scientific Management.

Week 2: Planning: Types of plans, planning process, Characteristics of planning, Traditional objective setting, Strategic Management, premising and forecasting


Week 4: Management by Objectives: Management by exception; Styles of management: (American, Japanese and Indian), McKinsey’s 7-S Approach, Self Management

Week 5: Organizing: Organizational design and structure, Coordination, differentiation and integration.

Week 6: Span of management, centralization and de-centralization Delegation, Authority & power - concept & distinction, Line and staff organizations


Week 10: Leading: Human Factors and Motivation, Leadership, Communication, Teams and Team Work

Week 11: Leading: Human Factors and Motivation, Leadership, Communication, Teams and Team Work

Week 12: Controlling: Concept, planning-control relationship, process of control, Types of Control, Control Techniques Characteristics of team

BOOKS AND REFERENCES

1. Principles of management : Stoner
2. Principles of management: Koontz O’donell
TEXT, TEXTUALITY AND DIGITAL MEDIA

PROF. ARJUN GHOSH
Department of Humanities and Social Sciences
IIT Delhi

TYPE OF COURSE : Rerun | Elective | UG
COURSE DURATION : 12 weeks (20 Jul'20 - 09 Oct'20)
EXAM DATE : 17 Oct 2020

INTENDED AUDIENCE : Undergraduates: Those interested in studying the history of the book and the onset of digital media

COURSE OUTLINE :
The emergence of digital means of communication and representation is transforming the way human beings assimilate and engage with knowledge. To understand this process, this course will help to understand the evolution of language, narratives and representation through the history of technologies of communication – oral, written, print and the digital. It will explore concepts of Copyright, Censorship, Authorship, Nation Formation. Students would engage in debates surrounding Blogging, Facebook, Google, Twitter, Instagram, Video games, Wikipedia and other forms of Electronic texts. Students who have already completed a Literature course are likely to benefit from the experience.

ABOUT INSTRUCTOR :
Prof. Arjun works on the Politics of performance and Mobilisation, Copyright and Intellectual property, New media and the Internet. He was formerly a Fellow at the Indian Institute of Advanced Study, Shimla and currently teaches at IIT Delhi. He is the author of A History of the Jana Natya Manch: Plays For the People (Sage, 2012) and Freedom from Profit: Eschewing Copyright in Resistance Art (IIAS, 2014) and an annotated translation of Nabanna (Rupa, 2018).

COURSE PLAN :
Week 1: Understanding Media
Week 2: Writing as Technology
Week 3: Seeing as writing
Week 4: Discovery of Printing
Week 5: History of the book
Week 6: Print and Nationalism
Week 7: Origins of Copyright
Week 8: Television and society
Week 9: Electronic Literature
Week 10: Future of the Book
Week 11: Digital Media and the Mind
Week 12: Social Media and Search Engines
INTRODUCTION TO OPERATING SYSTEMS

PROF. CHESTER REBERIO
Dept. of Computer Science and Engineering
IIT Madras

TYPE OF COURSE : Rerun | Core | UG
COURSE DURATION : 8 weeks (20 Jul’20 - 11 Sep’20)
EXAM DATE : 27 Sep 2020

INTENDED AUDIENCE : B.E./MSc (Computer Science)
PRE-REQUISITES : Good knowledge of C, Computer Organization and Architecture, x86 Assembly level programming.

COURSE OUTLINE :
Operating systems (OS) provide the crucial interface between a computer’s hardware and the applications that run on it. It allows us to write programs without bothering much about the hardware. It also ensures that the computer’s resources such as its CPU, hard disk, and memory, are appropriately utilized. In this course, we dwell into how the OS manages to do all this in an efficient manner. This is an introductory course for students with prior knowledge of computer organization. The course is based on an OS called xv6, which in many ways is similar to the Linux operating systems.

ABOUT INSTRUCTOR :
Prof. Chester Rebeiro is an Assistant Professor at IIT Madras. He completed his PhD from IIT Kharagpur and a post-doc from Columbia University. His research interests are in cryptography, system security, especially hardware and operating system security.

COURSE PLAN :
Week 1: Introduction
Week 2: Memory Management
Week 3: Processes
Week 4: Interrupts and Context Switching
Week 5: Scheduling
Week 6: Synchronization
Week 7: Deadlocks
Week 8: Operating System Security
The course aims to equip students to develop themselves into a critically reflective and capable HRD practitioner, or a manager who can facilitate the learning of others. The major objective of the course is to explain and demonstrate the contribution of HRD in an organization and enable student to develop an ability to decide learning and training needs; and have competence in the design and delivery of learning programmes. Organizations are made up of people: their knowledge, skills, attitudes and interconnections. In order to survive and thrive, organizations need to facilitate the growth of all of these as part of a HRD strategy. Human Resource Development (HRD) is a key activity that systematically leads to the growth and development of people in organisations, and makes organisations more effective. The process of identifying needs and designing and delivering HRD interventions that are part of the course are crucial skills for all managers. The course will focus on the role of HRD in designing and implementing appropriate strategies in line with the business goals of their organization.

Dr. Kailash B.L. Srivastava is a Professor, Department of Humanities and Social Sciences and Joint Professor in Vinod Gupta School Management, and specializes in the area of Human Resource Management and Development and Organizational Behaviour at Indian Institute of Technology, Kharagpur. He holds a first class Master’s degree in Psychology from Gorakhpur University and Ph.D. from Indian Institute of Technology, Kanpur, and has around 25 years of teaching, research, and training experience.

### COURSE PLAN:

**Week 01**: Introduction to Human Resource Development: Emergent of HRD, Critical HRD roles, challenges for HRD.

**Week 02**: HRD in global perspective, HRD- Performance link, Strategic perspective of HRD.

**Week 03**: HRD Process Model: identification of HRD needs and Design and development of HRD programmes.

**Week 04**: HRD Process Model: Methods of Implantation, Evaluation of HRD programmes.

**Week 05**: Employee coaching and performance management: Coaching to improve poor performance, coaching/analysis.

**Week 06**: HRD interventions: Mentoring for employee development: Role of mentoring in development.

**Week 07**: Employee counseling for HRD: Overview of counseling programmness, employee assistance programme, stress management, employee wellness and health promotion.

**Week 08**: Competency framework of HRD: why competency mapping? Understanding the competency mapping framework.

**Week 09**: Career Planning, management, and development: Career development stages and activities, role of individual and organization in career planning, Issues in career management.

**Week 10**: Intellectual capital (IC), its measurement and management: Components of IC, measurement models of IC, IC index and challenges for HR.

**Week 11**: HRD, Organizational Learning, and learning organizations.

**Week 12**: The future of HRD and HRD Ethics: Research, practice and education of HRD for innovation and talent development and management, Role of HRD in developing ethical attitude and behavior and development, Ethical problems with HRD roles.
ECONOMICS OF HEALTH AND HEALTH CARE

PROF. ANGAN SENGUPTA
Dept. of Management, Amrita Vishwa Vidyapeetham
IIT Kanpur

TYPE OF COURSE : Rerun | Elective | PG
COURSE DURATION : 8 weeks (17 Aug ‘20 - 09 Oct ‘20)
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : M.E, M.Tech
INDUSTRIES APPLICABLE TO : Public Health Organizations, Hospitals, Allied Healthcare Providers, Pharmaceutical companies, NGO.

COURSE OUTLINE :
When I was doing my doctoral research in the area of Health Economics several people asked me “What does this Economics in Healthcare mean?” Health economics or Economics of Healthcare is a discipline of economics which is concerned with the association between health status and the related resources assessing the value, behavior, efficiency and effectiveness of various stakeholders in the production and consumption of healthcare. Health Economics has not been studied well in India or in many other developing countries, unlike the developed economies.

ABOUT INSTRUCTOR :
Dr. Angan Sengupta is an Assistant Professor with the Dept. of Management, Amrita Vishwa Vidyapeetham, Bangalore campus. He has done his PhD in the area of Health Economics and Policy from Maastricht University, The Netherlands. He has post-graduation degrees in Economics from Calcutta University and in Population Studies from International Institute for Population Sciences (IIPS), Mumbai. He has garnered corporate experience working with A.C. Nielsen ORG-MARG, while his research and teaching experience includes various institutes and organizations like, International Institute for Applied Systems Analysis (IIASA), Austria, Indian Institute of Management, Bangalore, Institute of Health Management Research, Bangalore. Dr. Sengupta has worked on various large scale implementation and M&E surveys. Dr. Angan is a recipient of ICSSR doctoral fellowship as well as UGC NET-Junior Research Fellowship. He also earned a fellowship from TIFAC, Ministry of Science and Technology, Govt. of India to conduct a research as a Young Summer Scientist in IIASA, Austria. He has presented research papers in several national and international conferences and public seminars and also published scientific papers in highly reputed national and international journals. His research interests include Population and Health Economics, Economics of Ecology and Natural Resources, Statistics, Demography, and Epidemiology.

COURSE PLAN :

Week 01 : Introduction, Consumer Behaviour, Demand and Supply.
Week 02 : Elasticity of demand and supply, Theory of Production.
Week 03 : Theories of Cost and Grossman’s Demand for Healthcare.
Week 04 : Market Imperfections, Healthcare Financing.
Week 05 : Health Insurance.
Week 08 : Population, Health and Development.
EDUCATIONAL LEADERSHIP

PROF. ATASI MOHANTY
Department of Industrial and Systems Engineering
IIT Kharagpur

TYPE OF COURSE : Rerun | Elective | PG
COURSE DURATION : 8 weeks (20 Jul’20 - 11 Sep’20)
EXAM DATE : 27 Sep 2020

INTENDED AUDIENCE : M.A.in Education/ M.Ed, PG Course, Elective Course
PRE-REQUISITES : Graduation
INDUSTRIES APPLICABLE TO : All Educational Institutes & Educational Professionals

COURSE OUTLINE :
In the context of Global, Multicultural & Virtual work environments domain knowledge alone is not a sufficient guarantee for professional success. Since long we have been talking about organizational leadership or corporate leadership. In fact leadership is an adjective mostly attached to the growth of industry. Rarely do we realize the importance of leadership in educational institutions. This course is designed to help the teaching/Academic professionals to understand how educational leadership can transform and enhance the effectiveness of educational institutions. This course intends to focus on academic community and to encourage individual members to develop various skills, competencies, abilities to enhance their leadership skills. It will also help them to develop awareness into their self-motivation, reflective practices, critical thinking and positive plans of actions for enhancing their leadership impact and institutional effectiveness. This course is aimed to mobilize human resources of education sector, educational administration and prospective teachers.

ABOUT INSTRUCTOR :
Prof. Atasi Mohanty has done her Ph.D. in Educational Psychology from Centre of Advanced Study in Psychology, Utkal University, Bhubaneswar, India. She has also earned her M.Phil. degrees both in Education and Psychology. Prior to joining Centre for Educational Technology, IIT Kharagpur, she was teaching in Visva-Bharati university, Santiniketan. Her area/s of teaching and research interest/s are Educational Psychology, Teacher Education, Mental Health & Human Resource Development. She has also organized Workshops/Seminar/Short Term Courses on Professional Development and Educational Leadership.

COURSE PLAN :
Week 01 : Educational Management & Leadership: Issues & challenges
Week 02 : Professional Development & the Reflective Practitioner
Week 03 : Professional Ethics & Values in Teaching
Week 04 : Key Challenges for Educational Leaders: Grooming Capable & Authentic Educational Leaders
Week 05 : Emotional Intelligence & Educational Leadership
Week 06 : Leadership for Managing Diversity & Inclusion in Education
Week 07 : Educational Leadership in a changing World : 21st Century Challenges
Week 08 : Innovative Pedagogy, Technology & Turnaround Leadership : The Stakeholders’ Perspectives
SOFT SKILLS

INTENDED AUDIENCE : BE/B.Sc/B.A, ME, M.Sc./M.A, Ph.D
PRE-REQUISITES : Basic knowledge of reading and writing English.
INDUSTRIES APPLICABLE TO : Can be useful to all major companies, such as L&T, BHEL, NBCC, NTPC, WIPRO, INFOSYS, and other organizations where HR has a crucial role.

COURSE OUTLINE :
Soft Skills, a buzz word today has attracted the attention of students, professionals and entrepreneurs all over the world. Employability, being the major concern today, every individual aims at getting coveted jobs. Employability today is commensurate with proving multiple skills in varied situations in a fast changing world. Hence, everyone aspiring for jobs today has to prove one’s mettle in various situations where one requires to be armed with different skills, which, collectively come under Soft Skills. One may be armed with good competence of one’s subject but one cannot compete with his peer groups unless one has the potential of performance. Performance can be ensured with the demonstration of certain abilities that can help a professional communicate, corroborate, convince, evaluate and look into the continuing as well as the upcoming trends of the corporate world from time to time.

ABOUT INSTRUCTOR :
Prof. Binod Mishra, Associate Professor of English at IIT Roorkee, Uttarakhand, has a teaching experience of 21 years in different reputed colleges and universities. He has taught courses like Technical Communication Skills, Soft Skills, Language Skills, Modern Drama and Diasporic Literature etc. A Ph.D on the works of Mulk Raj Anand, Mishra has to his credit 20 books (15 edited and 05 authored) on various aspects of English language and literature. A life member of several literary associations, Dr. Mishra is on the editorial advisory board of several reputed journals, BoS member of several universities and two times elected Editor-in-Chief of Indian Journal of English Studies, one of the oldest journals of English language and literature.

COURSE PLAN :
Week 01 : Introduction to Soft Skills, Aspects of Soft Skills, Effective Communication Skills, Classification of Communication, Personality Development.
Week 02 : Positive Thinking, Telephonic Communication Skills, Communicating Without Words, Paralanguage.
Week 03 : Proxemics, Haptics: The Language of Touch, Meta-communication, Listening Skills, Types of Listening.
Week 04 : Negotiation Skills, Culture as Communication, Organizational Communication.
Week 05 : Communication Breakdown, Advanced Writing Skills, Principles of Business Writing, Types of Business Writing.
Week 09 : Leadership Skills, Group Discussion, Group Discussion, Meeting Management, Adaptability & Work Ethics.
Week 12 : Drafting an Effective Resume, Facing Job Interviews, Emotional Intelligence & Critical Thinking, Applied Grammar.
REMOTE SENSING AND GIS

PROF. RISHIKESH BHARTI
Department of Civil Engineering
IIT Guwahati

TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 8 weeks (20 July'20 - 11 Sep'20)
EXAM DATE : 27 Sep 2020

INTENDED AUDIENCE : PG Students
INDUSTRIES APPLICABLE TO : Rolta India, RMSI Private Limited, ArcGeosystems

COURSE OUTLINE :
This course will introduce the students to the state-of-the-art concepts and practices of remote sensing and GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advanced methods will be covered. This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Upon completion, the participants should be able to use remote sensing (Satellite images and Field data) and GIS in their future research work.

ABOUT INSTRUCTOR :
Prof. Rishikesh Bharti is a faculty member at the Department of Civil Engineering, Indian Institute of Technology Guwahati. He has been teaching Advanced Remote Sensing, Geohazard Science and Engineering, Advanced Techniques in Geoscience, Engineering Geology to the B.Tech, M.Tech and PhD students at IIT Guwahati. Hydrogeomorphology, Geospatial modelling, Snow and Glacier Studies, Spectroscopy of natural and manmade materials and Advance remote sensing (Hyperspectral and thermal) for the earth and planetary exploration are his major research interests.

COURSE PLAN :
Week 1: Remote Sensing Data and Corrections
Week 2: Satellite Image Corrections
Week 3: Digital Image Processing-I
Week 4: Digital Image Processing-II
Week 5: Thermal and Microwave
Week 6: Imaging Spectroscopy-I
Week 7: Imaging Spectroscopy-II & GIS-I
Week 8: GIS-II and Application
Classical Sociological Theory

By Prof. R. Santhosh  |  IIT Madras

This course introduces students to the formative period of sociology and the socio-cultural as well as the intellectual factors behind the emergence of the discipline. It provides a comprehensive understanding and an in-depth analysis of the stalwarts of classical sociological theory such as Karl Marx, Emile Durkheim, Max Weber, and G H Mead. It explains how the theoretical concerns of these scholars laid the foundation for the subsequent development of sociology as a distinct social science discipline with precise theoretical as well as methodological foundations. Thus, the course enables students to develop a sociological perspective and theoretical insights through a systematic analysis of the key theorists of the discipline.

INTENDED AUDIENCE : Undergraduate as well as postgraduate students of sociology, aspirants of competitive examinations and general public who are interested in the discipline of sociology.

PREREQUISITES  : None

COURSE LAYOUT

Week 1: Introduction to sociology; uniqueness of sociological perspective
Week 2: Historical context of the emergence of sociology: European Enlightenment
Week 3: August Comte, Herbert Spencer and early thinkers of modernity
Week 4: Karl Marx
Week 5: Karl Marx
Week 6: Emile Durkheim
Week 7: Emile Durkheim
Week 8: Max Weber
Week 9: Max Weber
Week 10: GH Mead
Week 11: Classical theory and methodological orientations in sociology
Week 12: Sociology and modernity: wrapping up and conclusion

BOOKS AND REFERENCES

PRE-REQUISITES : none

INTENDED AUDIENCE : Students of Business Management, Marketing, Product Management, Architecture, Engineering, Commerce, Infrastructure Design and Management Candidates appearing for Job interviews, Potential Negotiators, Marketing professionals

INDUSTRIES APPLICABLE TO : This course would also be very useful for the aspirants for Government as well as Private employment

COURSE OUTLINE :
The primary focus of this course is to highlight various categories and applications of soft skills through various cases extracted from the real field and other research case studies. The fundamental concepts and distinctions between Soft Skills and Hard Skills are discussed. The course is tailored very effectively to introduce various Soft skill application examples. This course would be very useful for the students, practicing professionals as well as common people who are voluntarily or involuntarily involved in negotiations and strategies in daily life.

ABOUT INSTRUCTOR : Prof. Uttam K. Banerjee is currently a senior Professor in the Department of Architecture Regional Planning, as well as Joint-Faculty in the RCG School of Infrastructure Design and Management at the Indian Institute of Technology Kharagpur, where he has served as the Head in both the departments from 2004 to 2007 and 2011 to 2014 respectively. He has graduated with Bachelor of Architecture (B.Arch), post-graduated with Master of City Planning (MCP) and Ph.D. in Transportation system evaluation from Indian Institute of Technology Kharagpur.

COURSE PLAN :
Week 1: Soft Skills and Hard Skills
Week 2: Non-verbal communications
Week 3: Negotiations
Week 4: Professional Negotiations
Week 5: Business Negotiation
Week 6: Product Marketing Negotiation
Week 7: Negotiation for Services
Week 8: Marketing Strategy
Week 9: Power Marketing
Week 10: Power Marketing Strategies
Week 11: Power Marketing Presentations
Week 12: Time Management in Marketing

SOFT SKILLS FOR BUSINESS NEGOTIATIONS AND MARKETING STRATEGIES

DR. UTTAM K. BANERJEE
Department of Architecture & Regional Planning
IIT Kharagpur

TYPE OF COURSE : Rerun | Elective | PG | UG
COURSE DURATION : 12 weeks (20 Jul’ 20 - 9 Oct’ 20)
EXAM DATE : 17 Oct 2020
NUMERICAL METHODS

PROF. AMEEYA KUMAR NAYAK
Department of Mathematics
IIT Roorkee

PROF. SANJEEV KUMAR
Department of Mathematics
IIT Roorkee

TYPE OF COURSE : Rerun | Core | UG
INTENDED AUDIENCE : B.E/B.Tech, B.Sc
EXAM DATE : 17 Oct 2020
COURSE DURATION : 8 weeks (17 Aug’20 - 09 Oct’20)
INDUSTRIES APPLICABLE TO : TCS, Intel, General Electric, General Motors, ABB, Nuclear Industries, etc.

COURSE OUTLINE :
This course is a basic course offered to UG student of Engineering/Science background. It contains solution of system of linear equations, roots of non-linear equations, interpolation, numerical differentiation and integration. It plays an important role for solving various engineering sciences problems. Therefore, it has tremendous applications in diverse fields in engineering sciences.

ABOUT INSTRUCTOR :
Dr. Ameeya Kumar Nayak is Associate Professor in Department of Mathematics at IIT Roorkee and actively involved in teaching and research in the direction of numerical modeling of fluid flow problems for last ten years. His research interests are in the fundamental understanding of species transport in macro and micro-scale confinements with applications in biomedical devices and micro electro mechanical systems.

Dr. Sanjeev Kumar is working as an Associate Professor with Department of Mathematics, IIT Roorkee. Earlier, he worked as a postdoctoral fellow with Department of Mathematics and Computer Science, University of Udine, Italy and assistant professor with IIT Roorkee.

COURSE PLAN :
Week 01 : Introduction to significant digits and errors, Solution of system of linear Equations (direct methods, Iterative methods, Ill-conditioned systems)
Week 02 : Roots of Nonlinear Equations (Bisection method, Regula-Falsi method, Newton-Raphson method, Fixed point iteration method, convergence criteria)
Week 03 : Eigenvalues and Eigenvectors, Gerschgorin circle theorem, Jacobi method, Power methods
Week 04 : Interpolation (Finite difference operators, difference tables, Newton's Forward/Backward difference)
Week 05 : Interpolation (Central difference formula's i.e. Bessel and Stirling's interpolation formulae, Divided differences, Lagrange interpolation and Newton's divided difference interpolation)
Week 06 : Numerical Differentiation (Using Forward/ Backward/central difference formula) Week:7 Integration (Trapezoidal and Simpson's rules for integration)
Week 07 : Numerical Integration
Week 08 : Solution of first order and second order ordinary differential equations (Euler method, Euler modified method, Runge-Kutta methods, Milne PC method)
SOFT SKILLS

PROF. BINOD MISHRA
Professor of English
IIT Roorkee

TYPE OF COURSE : Rerun | Elective | Core | UG/PG
COURSE DURATION : 12 weeks (20 Jul’20 - 9 Oct’20)
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : BE/B.Sc/B.A, ME, M.Sc./M.A, Ph.D
PRE-REQUISITES : Basic knowledge of reading and writing English.

INDUSTRIES APPLICABLE TO : Can be useful to all major companies, such as L&T, BHEL, NBCC, NTPC, WIPRO, INFOSYS, and other organizations where HR has a crucial role.

COURSE OUTLINE :
Soft Skills, a buzz word today has attracted the attention of students, professionals and entrepreneurs all over the world. Employability, being the major concern today, every individual aims at getting coveted jobs. Employability today is commensurate with proving multiple skills in varied situations in a fast changing world. Hence, everyone aspiring for jobs today has to prove one’s mettle in various situations where one requires to be armed with different skills, which, collectively come under Soft Skills. One may be armed with good competence of one’s subject but one cannot compete with his peer groups unless one has the potential of performance. Performance can be ensured with the demonstration of certain abilities that can help a professional communicate, corroborate, convince, evaluate and look into the continuing as well as the upcoming trends of the corporate world from time to time.

ABOUT INSTRUCTOR :
Prof. Binod Mishra, Associate Professor of English at IIT Roorkee, Uttarakhand, has a teaching experience of 21 years in different reputed colleges and universities. He has taught courses like Technical Communication Skills, Soft Skills, Language Skills, Modern Drama and Diasporic Literature etc. A Ph.D on the works of Mulk Raj Anand, Mishra has to his credit 20 books (15 edited and 05 authored) on various aspects of English language and literature. A life member of several literary associations, Dr. Mishra is on the editorial advisory board of several reputed journals, BoS member of several universities and two times elected Editor-in-Chief of Indian Journal of English Studies, one of the oldest journals of English language and literature.

COURSE PLAN :
Week 01 : Introduction to Soft Skills, Aspects of Soft Skills, Effective Communication Skills, Classification of Communication, Personality Development.
Week 02 : Positive Thinking, Telephonic Communication Skills, Communicating Without Words, Paralanguage.
Week 03 : Proxemics, Haptics: The Language of Touch, Meta-communication, Listening Skills, Types of Listening.
Week 04 : Negotiation Skills, Culture as Communication, Organizational Communication.
Week 05 : Communication Breakdown, Advanced Writing Skills, Principles of Business Writing, Types of Business Writing.
Week 09 : Leadership Skills, Group Discussion, Group Discussion, Meeting Management, Adaptable & Work Ethics.
Week 12 : Drafting an Effective Resume, Facing Job Interviews, Emotional Intelligence & Critical Thinking, Applied Grammar.
COMPUTER AIDED DRUG DESIGN

PROF. MUKESH DOBLE
Department of Biotechnology & Bioengineering
IIT Madras

TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 8 weeks (20 Jul '20 - 11 Sep '20)
EXAM DATE : 27 Sep 2020

INTENDED AUDIENCE : B.E/B.Tech, M.E/M.Tech
PRE-REQUISITES : Prior knowledge of biochemistry, bioinformatics
INDUSTRIES APPLICABLE TO : Pharmaceutical industries/Biopharma/biotech

COURSE OUTLINE :
Drug discovery and development is a time consuming and expensive process, taking about 10 years and costing about US 1.0 B dollars. Several candidates that enter clinical trials fail because of several reasons. Computer assisted drug design can speed up the process, reduce surprises and predict the properties, thereby reduce the cost of R&D. The course will cover structure and target based design, molecular modeling, quantum mechanics, drug likeness properties, QSAR and pharmacokinetic and dynamics using several softwares that are freely available.

ABOUT INSTRUCTOR :
Prof. Mukesh Doble is a Professor at the Department of Biotechnology at IIT Madras. He has previously worked in Imperial chemical Industries (ICI) and General Electric (GE) for 20 years. Areas of research are Biomaterials, Biopolymers, and Drug design. He has published 280 papers and 10 books and filed 10 patents (including two US). He has delivered online video courses in Downstream processes, Medical Biomaterials and Biostatistics and Design of Experiments

COURSE PLAN :

Week 01 : Introduction to drug discovery
Week 02 : Structure and property
Week 03 : ADME-rules
Week 04 : Force field/MM/QM
Week 05 : Boundary conditions/Conformation
Week 06 : QSAR/Pharmacophore
Week 07 : Enzymes/proteins structures/docking
Week 08 : PK/PD
LASER: FUNDAMENTALS AND APPLICATIONS

CHEMISTRY AND BIOCHEMISTRY

PROF. MANABENDRA CHANDRA
Department of Chemistry
IIT Kanpur

TYPE OF COURSE: Rerun | Elective | UG/PG
INTENDED AUDIENCE: Senior UG and PG students
PRE-REQUISITES: Basic knowledge of quantum mechanics and optics would be helpful

COURSE DURATION: 8 weeks (20 Jul’20 - 11 Sep’20)
EXAM DATE: 27 Sep 2020

COURSE OUTLINE:
A Laser is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. Because of its extremely high degree of monochromaticity, coherence, directionality, polarization, and power, etc., laser radiation or light has been widely used in high resolution spectroscopy and imaging, chemistry, optical communications, biomedicine, defense industries, etc. This course is intended for students who need to understand the basic principles of how lasers work and their main properties. This course provides the students a thorough understanding of the fundamentals of lasers: their unique properties, their operations and their applications. It will equip the students with the knowledge of how a coherent light is generated and amplified, the techniques behind different lasers' design, and applications of lasers in spectroscopy, chemistry, medicine, biology, military and other areas.

ABOUT INSTRUCTOR:
Dr. Manabendra Chandra is an Assistant Professor in the Department of Chemistry at IIT Kanpur. His area of specialization is experimental physical chemistry.

COURSE PLAN:

Week 01: Introduction; Importance: why laser?, unique properties of lasers; Brief history of laser development; Laser basics
Week 02: Concept of stimulated emission; Einstein’s coefficients; Population inversion; Amplification of stimulated emission; Laser instrumentation fundamentals: Cavity, resonator and pumping processes; Gain medium
Week 03: Coherent radiation, standing waves and modes; The kinetics of laser emission; Rate equations; Threshold conditions; Pulsed and continuous wave laser emission; Various pulsing techniques: cavity dumping, Q-switching and mode-locking
Week 05: Laser sources; different types of lasers; Laser instrumentation details
Week 06-08: Applications of lasers in spectroscopy, chemistry, biology, medical sciences and other fields.
The objectives of the course is to introduce and sensitize all BTech students to the issue of ecology, environment and sustainability. The lectures are aimed at posing various questions that are relevant for all students of engineering and management to incorporate sustainability and a sensitivity to ecology and environment in their design of products, processes and systems.

The course will be taught by multiple instructors who have expertise in different areas of ecology, environment and sustainability. The instructors are faculty at IIT Madras and researchers in other organisations in specific areas of expertise in this topic.

Week 01 : Dr. B.S. Murty: Introduction (1), Sustainability Definition / Goals, Climate Change (2), Case Studies (3) (Eg: Dams, Chemicals, e-waste, IOT, Landfill siting etc)
Week 02 : Dr. Sudhir Chella Rajan: Sustainability and Economics (3), Sustainability and Ethics (3)
Week 03 : Dr. Ligy Philip (Water Quality/ Waste Management): Water Quality and Treatment (3), Waste Management and Treatment (3)
Week 04 : Dr. B. S. Murty (Water Management/ Resources): Urban Drainage, Water Resource Management, Impact of Climate Change
Week 05 : Dr. Srinivas Jayanti (Energy): Energy Demand / Resources (1), Pollution from Energy generation (1), Energy and Climate Change (Global Warming) (1), Energy and Sustainability (1), Long Range and Short Range Solutions (1), (Global vs. India)
Week 06 : Dr. R. Ravi Krishna: Risk Assessment Definition (1), Pollutant Pathways / Safety/ Exposure (1), Liability /Examples (1), Life Cycle Assessment (2), Environmental Management and LCA (1).
Dr. Ligy Philip / Dr. Ravi Krishna: Solid Waste Management, Hazardous Waste Management, Wrap up Emphasis on Climate Change and Adaptation
DEVELOPING SOFT SKILLS AND PERSONALITY

PROF. T. RAVICHANDRAN
Department of Humanities and Social Sciences
IIT Kanpur

TYPE OF COURSE : Rerun | Elective | UG
COURSE DURATION : 8 weeks (17 Aug’20 - 09 Oct’20)
EXAM DATE : 18 Oct 2020

INDUSTRIES APPLICABLE TO : All industries/companies/organisations will recognize and value this course and recommend this for their employees and trainee programs.

COURSE OUTLINE:
The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one’s life and career. But only soft skills can ensure a person retain it, climb further, reach a pinnacle, achieve excellence, and derive fulfilment and supreme joy. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills.

ABOUT INSTRUCTOR:
Prof. T. RAVICHANDRAN is presently a Professor of English in the Department of Humanities and Social Sciences at the Indian Institute of Technology Kanpur, Uttar Pradesh, India. He has written about fifty research articles/book chapters, supervised six doctoral theses, edited a special issue on Cyberpunk Literature for the Creative Forum Journal, and published a book on Postmodern Identity. He is a recipient of the Fulbright-Nehru Academic and Professional Excellence Fellowship (2014-15) for his research/teaching at Duke University, North Carolina, USA. He is honored with Champa Devi Gangwal Chair Professorship at IIT Kanpur. In his distinguished twenty-five years of teaching career, he has taught various courses in English Language and Literature. His NPTEL Video and Web courses on Communication Skills are well-acclaimed nationally and internationally.

COURSE PLAN:
Week 02 : Conflict Resolution Skills: Seeking Win-Win Solution, Inter-Personal Conflicts: Two Examples, Two Solutions, Types of Conflicts: Becoming A Conflict Resolution Expert, Types of Stress: Self-Awareness About Stress, Regulating Stress: Making The Best out of Stress.
Week 03 : Habits: Guiding Principles, Identifying Good And Bad Habits, Habit Cycle; Breaking Bad Habits, Using The Zeigarnik Effect For Productivity And Personal Growth, Forming Habits of Success.
Week 04 : Communication: Significance Of Listening, Active Listening, Barriers To Active Listening; Telephone Communication: Basic Telephone Skills, Advanced Telephone Skills, Essential Telephone Skills.
Week 06 : Communication Skills: Effective Communication, Arising Out Of Sender/Receiver’s Personality; Barriers To Communication: Interpersonal Transactions, Miscommunication; Non-Verbal Communication: Pre-Thinking Assessment-1 & 2.
ENERGY ECONOMICS AND POLICY

PROF. SHYAMASREE DASGUPTA
Department of Humanities and Social Sciences
IIT Mandi

TYPE OF COURSE: Rerun | Elective | UG/PG
COURSE DURATION: 8 weeks (17 Aug’20 - 09 Oct’20)
EXAM DATE: 18 Oct 2020

PRE-REQUISITES: Any foundational course in Economics
INTENDED AUDIENCE: Primarily the graduate students working in the area of energy economics and energy policy domain. This course will also be useful for general audience
INDUSTRIES APPLICABLE TO: Power Sector; Energy consulting firms; Renewable Energy production units, Policy makers

COURSE OUTLINE:
The course deals with understanding energy as a scarce resource, various aspects of energy demand and supply with a focus to policies that are in place to promote renewable energy supply and finally, a much needed discussion on interaction between energy, environment and climate change. The course aims at broadening the vision of students while making any energy related decision as a technology developer, energy manager, entrepreneur, policy maker, researcher in future or simply for personal energy use in day to day activities.

ABOUT INSTRUCTOR:
Prof. Shyamasree Dasgupta is an Assistant Professor at the School of Humanities and Social Sciences in Indian Institute of Technology Mandi. She is an economist by training. Her teaching and research interest remains in the area of energy, environment, climate change and sustainable development. She obtained Ph.D and M.Phil in Economics from Jadavpur University, Kolkata, India with SYLFF Fellowship. She is a member of several active academic/research networks including International Association of Energy Economics, Indian Society for Ecological Economics, The Indian Econometric Society etc. She is a contributing author in the Industry Chapter of IPCC AR 5.

COURSE PLAN:
Week 1: Energy as a Scarce Resource; Classification, Measurement and Accounting of energy resources
Week 2: Energy Demand-Part I- Analyzing past, present and future demand
Week 3: Energy Demand-Part II - Demand Side Management and policies
Week 4: Energy Demand – Part III - Behavioral issues and energy policies
Week 5: Energy Supply- Part I – Economics of non-renewable energy supply
Week 6: Energy Supply- Part II- Economics and policies to promote renewable energy supply
Week 7: Energy Market
Week 8: Energy, Environment and Climate change
INTEGRATED WASTE MANAGEMENT FOR A SMART CITY

PROF. BRAJESH KUMAR DUBEY  
Department of Civil Engineering  
IIT Kharagpur

TYPE OF COURSE : Rerun | Core | PG  
COURSE DURATION : 12 weeks (20 Jul’20 - 09 Oct’20)  
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : B.E/B.Tech, M.E/M.Tech, M.S, B.Sc, M.Sc, PhD, Field Professionals and Academicians  
PRE-REQUISITES : Environmental Sciences, Introduction to Environmental Engineering

INDUSTRIES APPLICABLE TO : Larsen and Turbo, Tata Group of Industries, Ramky Group of Industries, IF&LS Environment

COURSE OUTLINE:
This course has emphasises on Integrated Solid Waste Management aspects within the broad subject area of Integrated Waste Management for a Smart City. The issues of Municipal Solid Waste (MSW) management, Construction and Demolition (C&D) Waste and Electronic Waste Management will be covered in this course. The topics will include: generation rates and waste composition; Integrated waste management issues, collection, recovery, reuse, recycling, energy-from-waste, and landfilling; Biological treatment of the organic waste fraction - direct land application, composting, and anaerobic digestion. The environmental impact of waste management and its relationship on the big picture sustainable development and smart city development will be discussed. A major focus of this course will be the role of MSW management within the various initiatives of the Govt. of India including: Swachh Bharat Mission, Smart Cities as well as Make in India. The challenges of waste management for smart cities will also be discussed taking case studies from the first list of 20 smart cities identified in the first phase for this program. This will be followed by overview of the Construction and Demolition (C&D) Waste and Electronic Waste (E-Waste) management issues in India in general and for the smart cities in particular. The new rules with respect of C&D Waste and E-Waste Management will be covered. The challenges of managing these waste streams effectively will be discussed.

ABOUT INSTRUCTOR:
Dr. Brajesh Kumar Dubey is an Associate Professor in the Division of Environmental Engineering and Management at Indian Institute of Technology (IIT), Kharagpur, India. Dr. Dubey has more than a decade of research, teaching, training and industrial outreach experience in the areas of Integrated Solid and Hazardous Waste Management, Life Cycle Assessment (LCA) and Sustainable Engineering. He has collaborated with UN agencies, World Bank, National Science foundation, Ontario Ministry of Environment and Auckland Regional Council on various projects including that in the area of LCA.

COURSE PLAN:

Week 01 : Introduction to Solid Waste Management  
Week 02 : Municipal Solid Waste Characteristics and Quantities  
Week 03 : MSW Rules 2016, Swachh Bharat Mission and Smart Cities Program  
Week 04 : Municipal Solid Waste Collection, Transportation, Segregation and Processing  
Week 05 : Disposal of Municipal Solid Waste  
Week 06 : Biochemical Processes and Composting  
Week 07 : Energy Recovery from Municipal Solid Waste  
Week 08 : Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country  
Week 09 : Construction and Demolition (C&D) Waste Management - Overview  
Week 10 : C&D Waste – Regulation, Beneficial Reuse of C&D Waste Materials  
Week 12 : E-Waste Management Rules 2016 and Management Challenges
NANOTECHNOLOGY IN AGRICULTURE

PROF. MAINAK DAS
Dept. of Biological Sciences and Bioengineering & Design
IIT Kanpur

TYPE OF COURSE : Rerun | Elective | UG | PG
COURSE DURATION : 8 weeks (17 Aug’20 - 09 Oct’20)
EXAM DATE : 17 Oct 2020

INTENDED AUDIENCE : B.E/B.Tech, M.E/M.Tech
PRE-REQUISITES : 10+2 in science
INDUSTRIES APPLICABLE TO : Agriculture industry, Seed industry, Fertilizer industry, Food technology industry

COURSE OUTLINE :
Modern agriculture is a chemical intensive process starting from fertilizer, pesticide to food preservation. Modern nanotechnology tools if used judiciously in future, have the ability to offer sustainable development along with the optimal, precision and more effective use of chemicals. In this course, I will be sharing my journey from basic agriculture to modern day nanoparticle based agriculture practices.

ABOUT INSTRUCTOR :
Prof. Mainak Das is a faculty at Biological Sciences and Bio-engineering & Design program. He works in the areas of bio-electricity, green energy, physiology, and sensor. He has a BS training in agriculture, MS training in animal physiology and a doctoral training in biomedical sciences. He has been working in the area of nanotechnology application in animals and plants for the past 18 years.

COURSE PLAN :
Week 01 : History of agriculture and the role of chemicals in modern agriculture
Week 02 : Overview of nanotechnology
Week 03 : Application of nanotechnology in modern day agriculture practices I
Week 04 : Application of nanotechnology in modern day agriculture practices II
Week 05 : Application of nanotechnologies in animal production
Week 06 : Nanotechnology and shelf life of agricultural and food products
Week 07 : Nanotechnologies for water quality and availability
Week 08 : Green nanotechnology and the role of good governance and policies for effective nanotechnology development
INTRODUCTION TO BIOSTATISTICS

PROF. SHAMIK SEN
Department of Biosciences & Bioengineering
IIT Bombay

TYPE OF COURSE : Rerun | Elective | Core | UG/PG
COURSE DURATION : 8 weeks (20 Jul'20 - 11 Sep'20)
EXAM DATE : 27 Sep 2020

INTENDED AUDIENCE : B.E/B.Tech, M.Sc, Ph.D
PRE-REQUISITES : Basic knowledge of 12th standard mathematics is sufficient.
INDUSTRIES APPLICABLE TO : Biotech companies, pharma companies and omics companies may be interested in this course.

COURSE OUTLINE :
Observations from biological laboratory experiments, clinical trials, and health surveys always carry some amount of uncertainty. In many cases, especially for the laboratory experiments, it is inevitable to just ignore this uncertainty due to large variation in observations. Tools from statistics are very useful in analyzing this uncertainty and filtering noise from data. Also, due to advancement of microscopy and molecular tools, a rich data can be generated from experiments. To make sense of this data, we need to integrate this data a model using tools from statistics. In this course, we will discuss about different statistical tools required to (i) analyze our observations, (ii) design new experiments, and (iii) integrate large number of observations in single unified model.

ABOUT INSTRUCTOR :
Dr. Shamik Sen joined IIT Bombay in July 2010 as an Assistant Professor in the Department of Biosciences and Bioengineering. Dr. Sen earned a B.E. in Mechanical Engineering from Jadavpur University, Kolkata, and a M. Tech in Mechanical Engineering from IIT Kanpur. He then completed his PhD in Mechanical Engineering from University of Pennsylvania, where he worked in the area of mechanobiology.

COURSE PLAN :
Week 01 : Introduction to the course, Data representation and plotting, Arithmetic mean, Geometric mean, Measure of Variability, Standard deviation.
Week 02 : SME, Z-Score, Box plot, Kurtosis, R programming, R programming, Correlation.
Week 03 : Correlation and Regression, Interpolation and extrapolation, Nonlinear data fitting, Concept of Probability: introduction and basics.
Week 04 : Counting principle, Permutations, and Combinations, Conditional probability, Conditional probability and Random variables, Random variables, Probability mass function, and Probability density function, Expectation, Variance and Covariance.
Week 06 : Sampling distributions and Central limit theorem Part-II, Central limit theorem Part-III and Sampling distributions of sample mean, Central limit theorem - IV and Confidence intervals, Confidence intervals Part-II.
Week 07 : Test of Hypothesis - 1, Test of Hypothesis - 2 (1 tailed and 2 tailed Test of Hypothesis, p-value) - (Type -1 and Type -2 error), T-test.
Week 08 : 1 tailed and 2 tailed T-distribution, Chi-square test, ANOVA, ANOVA for linear regression, Block Design
DEVELOPING SOFT SKILLS AND PERSONALITY

PROF. T. RAVICHANDRAN
Department of Humanities and Social Sciences
IIT Kanpur

TYPE OF COURSE: Rerun | Elective | UG
COURSE DURATION: 8 weeks (17 Aug’20 - 09 Oct’20)
EXAM DATE: 18 Oct 2020

INDUSTRIES APPLICABLE TO: All industries/companies/organisations will recognize and value this course and recommend this for their employees and trainee programs.

COURSE OUTLINE:
The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one’s life and career. But only soft skills can ensure a person retain it, climb further, reach a pinnacle, achieve excellence, and derive fulfilment and supreme joy. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills.

ABOUT INSTRUCTOR:
Prof. T. RAVICHANDRAN is presently a Professor of English in the Department of Humanities and Social Sciences at the Indian Institute of Technology Kanpur, Uttar Pradesh, India. He has written about fifty research articles/book chapters, supervised six doctoral theses, edited a special issue on Cyberpunk Literature for the Creative Forum Journal, and published a book on Postmodern Identity. He is a recipient of the Fulbright-Nehru Academic and Professional Excellence Fellowship (2014-15) for his research/teaching at Duke University, North Carolina, USA. He is honored with Champa Devi Gangwal Chair Professorship at IIT Kanpur. In his distinguished twenty-five years of teaching career, he has taught various courses in English Language and Literature. His NPTEL Video and Web courses on Communication Skills are well-acclaimed nationally and internationally.

COURSE PLAN:


Week 02: Conflict Resolution Skills: Seeking Win-Win Solution, Inter-Personal Conflicts: Two Examples, Two Solutions, Types of Conflicts: Becoming A Conflict Resolution Expert, Types of Stress: Self-Awareness About Stress, Regulating Stress: Making The Best out of Stress.

Week 03: Habits: Guiding Principles, Identifying Good And Bad Habits, Habit Cycle; Breaking Bad Habits, Using The Zeigarnik Effect For Productivity And Personal Growth, Forming Habits of Success.

Week 04: Communication: Significance Of Listening, Active Listening, Barriers To Active Listening; Telephone Communication: Basic Telephone Skills, Advanced Telephone Skills, Essential Telephone Skills.


Week 06: Communication Skills: Effective Communication, Arising Out Of Sender/Receiver's Personality; Barriers To Communication: Interpersonal Transactions, Miscommunication; Non-Verbal Communication: Pre-Thinking Assessment-1 & 2.
